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ABSTRACT

This report is related to a study of first grade reading groups and presents highlights of an analysis comparing treatment and control teachers on their use of 22 instructional principles suggested in an instructional model. The principles are presented in categories that relate to getting and maintaining the students' attention, introducing the lesson and new material to the students, calling on individual students in the group, dealing with individual learning rates within the group, giving feedback to incorrect and correct answers, and giving praise and criticism. The results discussed indicate that certain teacher behaviors can be influenced by treatment. (AEA)

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Analyses of Treatment Effects in an Experimental Study of First Grade Reading Groups

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This paper presents partial data from the First Grade Reading Group Study, conducted by the Correlates of Effective Teaching Program (CET) at The Research and Development Center for Teacher Education at The University of Texas at Austin. This study yielded a large amount of data related to instruction of young children in small groups. The results presented in this paper concern differences between treatment and control teachers in their use of 22 principles of small group instruction.

Only the highlights of the results are given in this paper. More detailed information is presented in a technical report available through the R&D Center (Anderson, Evertson, and Brophy, Note 1).

The First Grade Reading Group Study was an experimental effort developed from the integration of research and knowledge about how young children function in a classroom, especially within the small group format. The most important sources of the ideas in the study were the Texas Teacher Effectiveness Study (Brophy and Evertson, 1976; Note 2), program development work done at the Southwest Educational Development Laboratory (1973) and the work of Marion Blank(1973).

The result of the integration of these sources was an instructional model consisting of 22 specific principles believed to promote effective teaching of young children in small groups. This model is presented as it applies to first grade reading groups in Brophy, Anderson, Greenhalgh, Ogden, and Selig (Note 3), and is discussed below.

Although the ideas present in the instructional model are based on previous research and experience suggesting their effectiveness in producing student learning, the purpose of the study was to test the model experimentally to confirm this. Such experimental efforts are necessary if the findings of correlational studies are to be validated and relationships between variables explained.

Therefore, two questions were of primary importance in this study:

1. Were the relationships between teacher behaviors and student achievement those which were predicted on the basis of past research?

2. Did the treatment teachers actually implement the behaviors suggested in the instructional model?

Analyses addressing the first question have indicated that many (although not all) of the teacher behaviors were related to student achievement in the predicted direction. In general, the treatment classrooms had significantly higher scores on tests of reading achievement. (These results are discussed in Anderson et al., Note 1.)

This paper addresses the second question by presenting highlights of the analyses comparing treatment and control teachers on their use of the behaviors suggested in the treatment. Conclusions can be drawn from these results as to the effectiveness of the treatment in inducing change in the teachers in the treatment group. This information is relevant to the larger question of how to translate knowledge about effective teaching into staff development for teachers.

The Instructional Model

The model was presented to the teachers as a set of guidelines for teacher management of reading group instruction. It was "curriculum free" in that it did not focus on the content or materials used in teaching reading, but only on teacher behaviors involved in managing the group as a whole or managing individual student responses. A major rationale for the model was that every child should receive as much individual attention as possible within the group setting, and a major objective of the model was to help teachers achieve the optimal balance between attention to the group and attention to individuals.

It was emphasized that the teacher's role in implementing the model was an active and important one. Application of the principles of the model involved teacher judgment based on knowledge of individual students' needs and the group's needs. The principles were meant to serve as guidelines to be applied as each teacher thought best for each of her groups.

The background and rationale for each principle are discussed below. The first 16 principles have to do with organization and management of the group as a whole, and the rest concern teacher responses to individual student answers. They are grouped as they were presented to the teachers. In the manual given to the teachers, the presentation of each principle (denoted here by underlining) was followed by a brief discussion of the rationale and some practical examples.

Principles 1 and 2 emphasized that it is important to catch and maintain the children's attention at the beginning of the lesson.

1. The teacher should use a standard and predictable signal to get the children's attention. In discussing this principle, it was suggested to the teachers that they use standard attention-getters in two situations: when engaged in transitions from general class activities to the reading group, and when getting students' attention at the beginning of the group lesson. The rationale for this principle was that less time would be wasted in transitions and in "settling down" behavior if the students learned to respond "automatically" to a familiar signal.
2. Once in the group, the children should be seated with their backs to the rest of the class while the teacher is facing the class. The rationale for this principle was that the students in the group would be less likely to be distracted by other activities in the class when seated this way, and that the teacher would be better able to monitor activities in the rest of the room while teaching the small group.

Principles 3, 4, 5, and 6 were concerned with introducing new material, and were based on the premise that an introduction should prepare the students for the lesson by getting their attention, teaching new skills and terms before asking the students to apply them, and making sure that the students know what to do in activities.

3. The introduction should contain an overview of what is to come in order to mentally prepare the students for the presentation. The rationale for this principle was that students who are "mentally prepared" for new knowledge or future activities can better receive and process that information. That is, an overview should help students organize their thinking and focus on the task at hand by pointing out relevant aspects.
4. It is also at the beginning of the lesson that new words and sounds should be presented to the children so that they can use them later when they are reading or answering questions. The rationale behind this principle was that students who know what to expect later in the lesson will be able to practice new skills more easily than they would if they encountered unfamiliar words in the midst of reading. It was assumed that reinforcement of new words within the reading lesson would be greater when the words were presented prior to encountering them within some context.
5. When new words or sounds are presented, the teacher should have the children repeat them until they can say them satisfactorily. This principle was an extension of Number 4; that is, once new information (in this case, new words) has been presented, it is important to initially practice using that information in small, simple steps so that the students gradually increase their skills in using it. (This is presumed to be especially important with "tool skills" such as beginning reading.)

6. After moving into the lesson, but before asking the children to use new material or undertake new tasks, the teacher should present a demonstration and/or explanation of any new activity. The discussion of this principle emphasized that a good demonstration or explanation included a carefully sequenced presentation of the processes involved in completing an activity, and was given in simple, clear language that children can understand. However, it was also emphasized that the teacher is the best judge of how much detail and how many steps need to be included in an explanation for a given group or student.

Principles 7 through 12 dealt with calling on children. This involved distributing individual response opportunities during the lesson, while at the same time keeping the entire group alert.

7. The teacher should work with one individual at a time in having the children practice the new skill and apply the new concept, making sure that everyone is checked and receives feedback during the lesson. The rationale behind this principle was that the teacher needed to monitor the progress of each group member, and that the only way to do this was to question each child individually. This implied that excessive use of choral responses would not be desirable.

8. The teacher should use a pattern (such as going from one end of the group to the other) for selecting children to take their turns reading in the group or answering questions (as opposed to calling on them randomly and unpredictably). The rationale for this principle was that students would know when to expect their turn responding, and that this would result in both lowered anxiety about being called on unexpectedly and increased teacher control of over-eager students who tend to call out answers or volunteer more intrusively than the quieter students.

9. In order to keep each member of the group alert and accountable at all times between turns, the teacher should occasionally question a child about a previous response from another child. The rationale behind this principle was that the occasional use of such comments would prevent any lapses of attention that might arise from the use of ordered turns. It was felt that these two techniques used together would produce optimal attention, as well as the other advantages of ordered turns described above.

10. Calling of volunteers should be primarily restricted to parts of the lesson in which children are contributing personal experiences or opinions. The rationale for this principle was that teachers who relied too much on volunteers would not be distributing response opportunities equally, so that shyer students might have less contact with the teacher and less skill practice than they needed. It was felt that some situations probably were appropriate for using volunteers, such as giving personal experiences or opinions, so it was left up to the teacher to decide when volunteers should be used. However, the principle emphasized that the best way to achieve the objectives of lessons focusing on reading skills was to use ordered turns and occasionally question a student out of turn.

11. When call-outs occur, the teacher should remind the child that everyone gets a turn and he must wait his turn to answer. The rationale behind this principle is similar to that of Number 10, in that letting students call out answers often results in the quieter, shyer students getting less interaction with the teacher.

12. The teacher should avoid rhetorical questions, asked for effect with no answer expected, or leading questions. Other questioning patterns to

be avoided are answering one's own questions and repeating questions. The rationale behind this principle was that it is important for the teacher to communicate to the students that every teacher question demands an answer, and that questions can be answered through applications of skills. It was felt that teachers who used these questioning patterns too much might confuse the students or teach them to "second-guess" the teacher by responding to her tone of voice or sentence pattern, rather than listening to the content of the question.

Principles 13 through 16 were concerned with meeting individual learning needs within the group setting. These principles suggested techniques such as breaking up the group, using another child as a model for the group, and arranging for tutorial help for students who were not meeting learning objectives within the standard group setting and time.

13. At some point during the lesson, the teacher must make a fundamental decision about whether the group as a whole can or cannot meet a lesson's objectives. The rationale behind this principle was that teachers who remained aware of individual differences in rates of learning of new material would be more likely to prevent problems that might arise when one or two students in the group were not learning as desired. In such a case, if the group remained together and the teacher taught at the level of most of the students, these few would be left behind. On the other hand, if she worked with one or two students who needed extra help, the other students would not be spending instructional time efficiently.

14. If the teacher decides that the group as a whole cannot reach the objectives at the same time, because of large individual differences

in comprehension of the material, she should teach the more able students through to the end of the lesson, dismiss them, and keep in the group those few who need extra help. This principle suggested specific techniques for breaking up the group when the teacher felt that it was wise to do so. It emphasized that the teacher should handle the breaking of the group without fanfare, and without negative statements regarding the students who remained for extra help.

15. Sometimes the teacher may wish to use one or more children who have mastered the objectives to serve as models for the others. One rationale for this principle was that sometimes students learn more quickly or pay more attention to peers whom they respect and like. Another rationale was that for some types of learning, especially rote or memory skills, it would be less frustrating for the teacher and a student to model the skills rather than to continue working with students who have not learned them yet because they haven't had enough exposure.

16. If one or more children still do not succeed in meeting the objectives within the time available for the lesson, provision should be made for tutorial assistance. The rationale for this principle was that students who failed to meet objectives within a group lesson needed to receive extra help instead of being allowed to fall behind. That is, the reading group setting could not be effective for them once they got behind and had missed important skills that were assumed and built on in succeeding lessons.

The second part of the model, principles 17 through 22, was concerned with the teacher's role in dealing with individual students in the group. These principles focused primarily on the feedback given to students about their

individual answers. Teacher judgment was especially crucial for these principles, because they distinguished among types of questions, types of pacing, and types of student answers:

a) A distinction was drawn between two types of questions: those which called for short, factual answers requiring only memory, and those which could be reasoned out. Giving students hints and encouraging them to reason through to an answer is a possible and sometimes desirable tactic to be used in connection with the latter type of question, but not the former. Factual questions usually require factual feedback.

b) It was assumed that different learning objectives would require different pacing strategies. Some lesson objectives are taught most effectively using fast-paced drill and short answers, while others are taught better in slower paced lessons. Extended feedback from the teacher takes time, so that the pace of the lesson is important to consider when offering feedback.

c) Obviously, the quality of the student's answer is very important to consider when deciding on feedback. Information given to a child about a correct response will differ from that given about an incorrect response. The problem facing a teacher when a child does not respond at all is very different from the problem of reacting to a partly incorrect response. Each of these situations requires a different feedback response from the teacher, depending upon the demands of the question and the capability of the child.

In general, the last six principles were based on the premise that any child's response, whether correct or incorrect, could be turned into a pleasant learning experience by the teacher, using appropriate feedback that considered both informational needs (types of question and types of answer) and the lesson's pace. Most of the suggestions about simplifying questions are based on Blank's (1973) work.

17. After asking a question, the teacher should wait for the child to respond and also see that other children wait and do not call out answers. During rapid pacing, she should wait a few seconds and give the answer if there is no response. During the more slowly paced parts of the lesson, the teacher should wait for an answer as long as she feels the child is thinking and will answer, but not so long as to embarrass the child or lose the other children's attention. If the child does not respond within a reasonable time in slower paced lessons, the teacher should indicate that some response is expected by probing. She should then simplify according to Principle 19. The rationale for this principle was that students should learn that a response is expected of them, and that the teacher should encourage this whenever she can without disrupting the pace of the lesson.

18. When the child is incorrect, the teacher should indicate that the answer is wrong, and then follow simplification procedures outlined in Principle 19. In communicating this principle to the teachers, it was emphasized that the incorrect answers should not be met with overly negative or rejecting reactions by the teacher, but that the student should know clearly what was wrong about the answer. The teacher should try to be as specific as possible about what was wrong. The rationale for this principle was that the student needed informative feedback if the incorrect answers were to be used constructively.

19. The appropriate simplification procedure is determined by the type of question.

    a) If the question deals with factual knowledge that cannot be reasoned out, the teacher should give the answer to the child and then move on.

b) If the question is one that the child could reason out with help, the teacher should provide clues or simplify the question. If clues still do not help the child, he should be given the answer. The teacher should never ask another child to supply the answer.

In explaining this principle to the teachers, it was emphasized that it was much more important for the teacher to stay with the child who had answered incorrectly, or who had failed to respond, than to go on to another student to get the answer. When the teacher gave the answer to the child, it could be done in several ways. The teachers were told that this depended on the pace that they were trying to maintain in the lesson. For a rapid pace, the teacher should probably give the answer and move on, perhaps occasionally having the child repeat the response. For a slower pace, the question could be restated in a form that simply called for agreement, repetition, or choosing between alternatives. When the question was one that the student was expected to figure out with help, if necessary, the teacher could give clues or rephrase in ways that guided the child's thinking in the right direction. If these clues did not help, the teacher could then give the answer rather than call on another child. The rationale underlying this principle was that first graders, at this point in their learning of basic reading skills, were more likely to listen to and understand information given during direct interactions with the teacher than they were to learn when hearing another student give the answer. Also, there might be unfortunate affective consequences if teachers regularly gave up and moved on to other students when the first student did not answer. Instead, on the "sustaining"

feedback approach (as embodied in this principle) was likely to communicate to each student that she expected and would be able to elicit some acceptable response to each question, and that all students could learn to listen, think, and respond.

20. When the student has answered correctly, the teacher should acknowledge the correctness and make sure that everyone else heard and understood the answer. The rationale for this principle was that young students do not necessarily know when they are correct, and that they deserve informative feedback on this point. It is also important for other students in the group that the correct answer be acknowledged. It was suggested in this principle that if other students did not hear or understand the answer, then the teacher might repeat the answer or have the original student repeat it. However, it was suggested that the teacher not get in the habit of following every answer with repetition.

21. Praise should be used in moderation. The teacher should praise thinking and effort more than just getting the answer, and should make praise as specific and individual as possible. The rationale here was that praise should be used on an occasional basis to reinforce the students, but if used too much, it would lose its value. It was assumed that making praise as specific as possible would convey more information to the student about his answer and would, therefore, be more effective feedback.

22. Criticism should also be as specific as possible, and should include specification of desirable or correct alternatives. The rationale for this principle was that there is sometimes a reason to give criticism because it can be informative to students and can point out

the relative aspects of their behavior and/or thinking. However, it was felt that the more specific the criticism, the more information is presented to students. Therefore, the rationale for this principle was very similar to that for praise.

In summary, these 22 principles created an instructional model which had as its underlying rationale an emphasis on getting and maintaining students' attention, sequencing information clearly for the students, and being very careful to provide information about the relevant aspects of a question or answer. Although it was not expressed this way in the materials given to teachers, the model clearly suggests that the teacher play a controlling and leading role in directing the reading group. In this sense, the model can be said to be a reflection of "direct instruction," in that it asks the teacher to take on the role of instructional leadership, through constant monitoring and control of students' behavior and information processing.

Methodology

Administration of treatment to teachers

After developing the instructional model, the next step in the study was to give it to teachers in the treatment groups and to arrange for a control group who did not receive treatment. Nine elementary schools and 27 female first grade teachers were involved in the study, divided among three groups as follows:

1. Treatment-observed. Ten teachers in three schools received the treatment (were instructed in the principles and agreed to use them in their teaching) and were observed teaching each of their reading groups throughout the year. (Student N = 192.)

2. Treatment-unobserved. Seven teachers in three schools received the treatment but were not observed during the year. This group was included to assess treatment effects on achievement in the absence of observation. (Student N = 147.)

3. Control-observed. Ten teachers in three schools were given no special instructions about how to teach. They were observed throughout the year. This group was included in order to measure natural implementation of the principles in the absence of a treatment. (Student N = 218.)

The schools were assigned to treatment groups by first creating three groups of three schools each which were comparable in SES composition and size. Although all of the schools were located in neighborhoods which were predominantly middle class and Anglo, there was some slight variation among the schools in SES ratings assigned by the district. Therefore, three groups were created so as to be balanced in this respect, before being randomly assigned as treatment or control groups.

The result of this process was that all participating teachers within a school were assigned to the same treatment group. This opened the possibility

of a school effect in the results, but this was considered a less serious risk than the possible contamination that would occur if teachers within a school were assigned to different groups.

All teachers who participated in the study had agreed to do so after discussing it with the principal investigators. Teachers in the two treatment groups were told of the purpose of the study (i.e., to experimentally test earlier correlational findings). Teachers in the control group were told that the purpose of the study was to find out more about effective teaching of first grade reading.

The 17 teachers in the treatment groups were given a short booklet (33 pages) which described the instructional model by presenting each principle and its rationale. They were asked to read it and meet again with one of the investigators a week later to discuss any questions they had. At this second meeting, the teachers took a short, multiple-choice test over their knowledge of the principles. All treatment teachers demonstrated sufficient knowledge of the model, and this was the extent of the treatment, although the teachers kept the booklets for reference. They each agreed to implement the principles in the model as they deemed them appropriate for their reading groups.

Classroom Observation

The treatment was applied in October, 1974, and observations of teachers in the treatment-observed and control groups began in November. From this time until May, 1975, each of these 20 classrooms was visited 15 to 20 times (approximately once a week), and observed systematically with a coding system developed specifically for the study (Brophy, Mahaffey, Greenhalgh, Ogden, and Selig, Note 4).

The observation system was designed with the 22 principles in mind. Therefore, it incorporated measures of implementation of the model, as well

as other measures to assess the possible effects of such implementation. The coding system was organized so that it would follow the natural flow of activities during the reading groups, but it could be broken down later into specific variables most relevant to discussion of each principle.

The system was divided into two parts. The first focused on the teacher's dealing with the group as a whole, and the second involved her academic interactions with individuals. This division reflected the theme running throughout the instructional model: the importance of maintaining a balance between management of the group as a whole and interaction with individuals within the group.

Group data collected during the observations. The measures in this section described the teacher's interactions with the group as a whole. These included activities occurring before the group lesson began, as well as certain contacts with the group as a whole that took place during lessons.

The first thing the observer would note during each observation was information about the teacher's managing the transition to the group and getting the attention of students once they were in the group. Specific measures here were addressed to the types of attention-getters used and the length of time it took to get students to the group and to get the lesson started. (This measured implementation of Principle 1). At this point, the observer would note how the students and the teacher were seated with respect to the rest of the class (Principle 2). Once the lesson was begun, the observer noted the use of an overview and its effects (Principle 3). At this point, the lesson proper would begin, and the observer would record information about interactions between the teacher and individual students (described below). However, during the rest of the lesson, the observer would note certain information about the way the teacher dealt with the group as a whole whenever it was available. This included

information about breaking up the group (as described in Principles 13 and 14), the use of a student as a model (Principle 15), the quality of demonstrations and explanations (Principle 6), the presentation of new words (Principles 4 and 5), choral responses and group call outs (Principle 7), and the use of undesirable types of questions directed to the group as a whole (Principle 12).

Individual data collected during the observations. When the teacher started the lesson, the observer began to describe each interaction between the teacher and an individual student that started with an academic question asked by the teacher (response opportunities). Any behavior contacts occurring during the lesson were also recorded. This coding of individual interactions continued until the group was dismissed, although it could be interspersed with coding of information about the group, as described above.

Each response opportunity was described as to the type of selection, the type of question, the type of answer, and the type of feedback. Each of these larger categories included several specific types of student or teacher behavior. For example, under the general heading of "selection," the observer would describe each interaction as to the method of selection used and whether it was an ordered turn, a volunteer, a call out, etc.

Behavior contacts were described in terms of the type of student misbehavior (e.g., social talk, misuse of materials), the type of teacher correction, and whether or not the correction was specific as to a desired alternative.

The data on response opportunities and behavior contacts were used to measure implementation of Principles 7-11 and 17-22.

All of the coding of individual students' interactions with the teacher was "low inference" in that the observer was classifying specific behaviors into categories according to preestablished definitions. Inference on the observer's part was limited, so that he or she was essentially just counting specific

behaviors when they occurred. Some parts of the group data collection were also low inference, in that they involved counting or timing, but other measures were "high inference." For these, the observer was asked to rate extent of use of a behavior or degree of appropriateness of its use.

The observers spent two weeks in the classrooms practicing with the system before actually beginning data collection. Pairs observed together until the criterion of 80 percent agreement on each major section of the coding system was reached. After that time, observers worked alone. Each teacher was seen by two observers who alternated visits to her classroom.

At the end of the year, when all observations were completed, many scores were computed for each teacher to represent the implementation and effect of each principle in the instructional model in her classroom. These scores represented sums for the entire year, standardized where necessary by the amount of time spent in observation.

Results

Data on implementation of the instructional model in the treatment and control classrooms are presented in this section. To determine whether the treatment had any effect on teachers' behaviors, the mean scores for the treatment group on each process measure were compared to the mean scores of the control group, in a series of one-way analyses of variance. It was assumed that the scores for the control teachers represented the base rates for these behaviors of first grade teachers in the area in the population, and that any significant group differences could be attributed to the treatment.

Variables measuring direct implementation, indirect effects of implementation, and other processes were compared for the two groups. Results are presented below as summaries of the findings for each group of instructional principles. A full discussion of the data and complete tables are given in Anderson et al. (Note 1).

Summary of results for principles relating to getting and maintaining the students' attention (Principles 1 and 2). It was expected that the treatment teachers would be more likely than the control teachers to use signals to get students' attention at the beginning of transitions and lessons, and that once the students were in the groups, treatment teachers would use seating arrangements to maintain student attention and minimize distraction from the rest of the room. The results indicate that these two principles were not implemented in the treatment group more than the control group.

There were few differences between the treatment and control groups regarding their use of signals to start transitions and begin lessons. Both groups often used signals for transitions, but neither group used signals to start lessons very frequently. Differences in types of signals cannot be attributed directly to the model. There were some results indicating that the treatment teachers may have had more efficient transitions, although these were not uniformly strong. Also, this cannot be directly related to the principle, because

it emphasized the use of a clear signal to achieve quick transitions, and the groups did not differ here. However, it is possible that having their attention drawn to transitions may have made the treatment teachers more aware of how well they organized and conducted them.

Results for variables measuring group seating also did not indicate high implementation in either group, although they suggested that the treatment teachers were slightly more likely to position their reading group students appropriately according to Principle 2.

Therefore, there was some evidence of a treatment effect for these two principles, but it was not very strong.

Summary of results for principles relating to introduction of the lesson and new material to students (Principles 3, 4, 5, and 6). The four principles in this part of the model were not implemented by the treatment group more than the control group. In fact, the few differences that did exist either could not be related directly to the instructional model or showed unexpected results. It had been expected that the treatment group teachers would give overviews more frequently, would present new words at the beginning of the lesson more often, would have students repeat them more often, and would give more and better demonstrations, checking to make sure that students understood them.

There were no differences for the use of overviews, and neither group used them more than half the time. (There was a nonsignificant trend in the expected direction, however.) The variables describing the introduction of new words did not reveal any differences that could be attributed directly to the treatment. Most teachers in both groups presented new words at the beginning of the lesson, as suggested in the treatment. Measures of new word presentation and repetition were based on a much smaller number of new words than expected, and they may be invalid if observers were failing to recognize new words that were not obviously pointed out. There were also no differences in teachers' use of demonstrations

to precede new tasks, as teachers in both groups did this a great deal. The control teachers were more likely to check students' comprehension before dismissing them to their seats to do assignments, which was not expected.

Therefore, it must be concluded that the instructional model did not influence the treatment teachers to systematically introduce the lesson and new material using the methods described in Principles 3 through 6.

Summary of results for principles relating to calling on individual students in the group (Principles 7, 8, 9, 10, 11, and 12). This set of principles called for frequent response opportunities to be given to individual students in the group, and provided guidelines for selecting students to respond and for giving feedback. There also were general guidelines about types of questions to avoid. It was expected that treatment teachers would have: a lower rate of group responses; a higher rate of individual responses; a lower rate of "no feedback" from the teacher; a higher rate of ordered selections and a correspondingly lower rate of volunteer selections and call outs, at least for academic questions; a higher rate of use of comments by other students; and a lower rate of use of undesirable questions.

Many of these expectations were supported. Treatment teachers did exhibit a lower rate of group responses, especially group call outs, and a higher rate of individual response opportunities, especially in nonturn interactions (single questions occurring outside of oral reading turns). Treatment teachers also had a much higher rate of use of ordered selection, in which respondents were called on in order around the group. Correspondingly, treatment teachers were less likely to rely on other types of selection: volunteering, preselection, nonvolunteers, and call outs. These results were strongest for reading questions.

There were no clear differences between the two groups in their use of student comments. There also were no differences between the groups in the

use of undesirable questions, with both groups demonstrating very low levels of use.

There were unexpected findings for the use of "no feedback" to answers, in that the treatment teachers were more likely to fail to give feedback than the control teachers. However, this only occurred in response to correct answers, where omission of feedback is a less serious problem.

In general, the principles in this section were implemented to different degrees with the strongest effects being on the use of individual response opportunities and ordered selection. In fact, the results for use of ordered turns probably were the strongest for any single principle. Apparently, the suggestions given about this in the materials were sufficiently clear and reasonable to encourage the teachers to try the technique, and their continued use of it (as indicated by the mean proportion scores) suggests that it was useful to them.

Summary of principles related to dealing with individual learning rates within the group (Principles 13, 14, 15, and 16). The first three principles had worse implementation than any other group. (Principle 16 was not directly examined through observational data.) Although it had not been expected that the treatment teachers would use the suggested techniques on a daily basis, it was expected that they would use them more often than the control group teachers. However, there were very few instances of breaking up the group because of ability differences in the way suggested, and there were no instances of use of models in either control or treatment classrooms.

One possible conclusion is that the behaviors suggested by these principles are inappropriate for first grade reading groups, so that there was no implementation because the teachers judged them as such. Another possible conclusion is that the techniques might be useful, but that the minimal treatment was not sufficient. These principles were different from many of the others in that they

were asking the teachers to try something novel. Most of the other principles were asking the teachers to use behaviors already familiar to them, but to use them more systematically. It seems likely that complex or novel behaviors would require more extensive treatment. The more a treatment or a program requires a teacher to change from his or her normal repertoire of teaching behaviors, the more necessary it will be to provide extensive rationales and opportunities for practice and feedback. These were not provided in this study, and the data suggest that they were needed for the principles discussed in this section.

Summary of results for principles related to feedback to incorrect answers (Principles 17, 18, 19). This group of principles as a whole had the strongest implementation of any in the instructional model. There was a basic pattern observed in all three types of answers (incorrect, no response, and "don't know") and both major types of questions (reading and nonreading). As expected, treatment teachers used more sustaining feedback, especially clues, and used less feedback which involved asking another student for the answer. There were fewer instances of other students calling out feedback in the treatment classrooms. The two groups were similar in their rate of giving the answer, especially during reading turn interactions.

In general, the differences between the two groups were strongest in interactions occurring outside of reading turns during question-and-answer sequences. It is probably during such interactions that the teacher can exert more choice about what kind of feedback to use, since the pace is slower. In oral reading turns, correcting mistakes as quickly as possible may be necessary to prevent interruptions of sentence or story meaning.

The treatment teachers were also slightly more effective with sustaining feedback than were the control teachers, when effectiveness was defined as yielding some improvement in the next answer. It is possible that they were concentrating more on the purpose of sustaining feedback, since the treatment

materials had discussed why it should be beneficial. Perhaps this is a case of a self-fulfilling prophecy on the part of the treatment teachers: they believed that sustaining feedback should help, and therefore they were working harder at using it, and, in the process, made it more useful to the students. The control teachers, on the other hand, may have had no particular expectations about the efficacy of the technique, and therefore may not have tried so hard to be effective with it. This difference between the groups is interesting because the purpose of the treatment was to increase the frequency of sustaining feedback. Nothing was said about ways of using it more or less effectively.

Summary of results for feedback to correct answers (Principle 20). This was not implemented as expected. In fact, the results were opposite to those predicted.

Treatment teachers were more likely than control teachers to fail to give feedback in total and nonturn interactions. However, the difference was not highly significant, and it did not hold up when examined separately for different types of questions. One possible explanation of these unexpected results is that feedback to correct answers is not as important as originally believed, and that teachers were using it only when they felt it was necessary. Perhaps there was something about the treatment classes that made feedback to correct answers less necessary than in the control classes. However, there is nothing apparent in the treatment that could account for this.

The control teachers used emphasis (repeating or having an answer repeated) more often in total and nonturn interactions, although the results were significant only at the .10 level. When broken down by question type, this pattern was maintained only for nonturn interactions with reading questions. The treatment did not specify that emphasis should follow every correct answer, but only that the teacher should make sure that everyone heard. In fact, it

mentioned that there could be problems with too much emphasis by repetition. Perhaps this made the treatment teachers more aware of potential problems, and therefore lessened their tendency to emphasize answers.

Summary of results for principles related to praise and criticism (Principles 21 and 22). Principle 21, describing ways of using praise, was implemented to some extent. Treatment teachers used less praise, which is interpreted to mean a more moderate amount of praise. This was most apparent following correct answers to reading questions. The treatment teachers used specific praise more often than the control teachers, but their level of use of specificity was still low. Therefore, this cannot be interpreted to mean strong implementation of the principle.

Principle 22 suggested that criticism should be very specific when delivered. There were no differences between the groups for any measures of this. Control teachers were already being specific some of the time, and the treatment teachers' use of specificity was no greater than theirs.

Discussion

Many of the behaviors suggested by the instructional model were implemented by the treatment teachers at a significantly higher rate than that shown by the control teachers. Some of the principles were not implemented at all by the treatment group, and some of them were already being used by the control group to the same extent as the treatment group.

The principles that showed the strongest treatment effect on teacher behaviors dealt with discrete, easily described behaviors that were probably already in the teachers' general repertoires of techniques (e.g., maximizing use of ordered selection and minimizing use of volunteers and call outs; maximizing appropriate use of sustaining feedback and minimizing use of asking another student for the answer). Although teachers might not have used these techniques extensively before the treatment, the description of the required behaviors was apparently understood. The teachers could easily analyze their own behaviors in these terms and monitor their use. They were also apparently convinced by the rationales for their inclusion in the treatment. These were behaviors suggested by earlier research in similar classroom settings, and so it is reasonable to assume that the teachers recognized their potential value.

On the other hand, behaviors that showed no treatment effect and were not highly implemented by either group were less specific and possibly novel to the teachers (e.g., use of a model, breaking up the group, use of a signal before lessons). The description and rationale for them was not sufficient to cause implementation. It cannot be determined from the data here if the failure to implement was due to lack of specificity, novelty, lack of sufficient rationale, or inappropriateness for the setting. (Teacher interview

data are available, and are being examined for possible resolution of these questions.)

Other behaviors were used to some extent by the control group, and the treatment did not increase the level of use by the treatment teachers. Examples of such behaviors were using a signal to start the transition and sitting in position to be able to monitor the entire class. Lack of significant differences for these variables might indicate that most teachers recognize the efficacy of the principles and are already implementing them regularly.

Even for those principles for which a treatment effect was found, it was evident that the effect was not an "all or nothing" phenomenon. That is, the treatment teachers never used a suggested technique all of the time, and the control teachers always used it some of the time. It is important to recognize this in building realistic treatment programs which acknowledge that teachers must use their own judgment about when the situation warrants a particular behavior. For example, sometimes a strong treatment effect was found only for interactions occurring outside of reading turns, where the pace is slower and the teacher's options for questions and feedback are greater. There are probably many other important types of contextual influences to consider in studying such classroom processes, especially when trying to bring about change in those processes.

Many of these possible contextual influences are examined in a companion paper by Anderson, Morgan, Evertson, and Brophy (Note 5).

In summary, the treatment was generally successful in influencing change in the treatment teachers' behaviors, but the results demonstrated that not all components of the treatment were equally successful. An analysis of the different results for these parts suggests that future treatment models should consider the specificity and familiarity of the behaviors, their appropriateness for particular contexts, and the role of teacher judgment in implementing them.

Reference Notes

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